



Continuing Education Article #5

Equine Stereotypies

Cornell University
Katherine A. Houpt, VMD, PhD

University of Pennsylvania
Sue M. McDonnell, PhD

KEY FACTS

- ❑ Stereotypical behavior may be a protective mechanism in a stressful environment.
- ❑ Although cribbing and wood chewing are different behaviors, both tend to begin when roughage is reduced in the diet.
- ❑ There is no evidence that cribbing is learned, but there is evidence that it is inherited.
- ❑ Providing stall toys is usually ineffective in reducing stereotypical behavior.
- ❑ Managing horses on pasture with other horses is currently the most reliable means of reducing locomotor stereotypies, such as weaving and stall walking.

The behavior problems discussed in this article are often referred to as vices. We avoid this term because (1) it is anthropomorphic, implying that horses are making moral decisions to act in an evil manner, and (2) the behaviors reflect a horse's response to a stress and may actually help to alleviate the stress of confinement. Veterinarians should approach these problems not as equine misdeeds that should be punished but as medical problems that can be understood on the basis of physiologic processes and treated via pharmacologic and management techniques.

Stereotypies are defined as stylized, repetitive, apparently functionless motor responses or sequences.¹ They occur in domesticated and captive wild species as well as in humans. Stereotypies in horses can be classified as locomotor stereotypies (which include weaving, stall circling, fence pacing, head bobbing, pawing, and wall kicking) and oral stereotypies (e.g., cribbing, wood chewing, and flank biting). Equine stereotypies vary considerably in the percentage of the horse's time occupied by the activity and in the vigor and persistence with which the behavior is performed.

Horses that exhibit stereotypies are often unthrifty as a result of the increased energy utilization or reduced feed intake or because the stereotypy is performed to the exclusion of normal eating or grazing. In some individuals, episodes of a stereotypy occur at predictable times, either seemingly unprovoked or in association with particular environmental events. In other individuals, the episodes are sporadic but obviously triggered by environmental events. Some horses with stereotypies seem nervous and prone to panic; others are relatively even-tempered and apparently well-adjusted animals.

There are numerous hypotheses regarding the origin of stereotypies in domesticated and captive wild animals. The most common scientific interpretation is that stereotypies begin as displacement activities, vacuum activities, intention movements, or mimicry. Each of these is presumed to be normal and adaptive in wild animals.

Displacement activities are behavioral sequences that appear in an unusual context. In birds, the classic example of a displacement activity is feeding or grooming in the middle of a fight sequence. Displacement responses are believed to occur with inherent motivational conflicts or when goal-directed activity is thwarted. The animal is apparently anxious or frustrated. A stabled horse may pace, weave, or paw as the feed cart advances down the aisle; the horse is anticipating the grain but unable to reach it. Similarly, stall walking or fence walking and weaving often begin when a horse is held behind in a stall or pasture when others are turned out or taken away. Stallions that can see or hear mares being teased but cannot reach them tend to paw, weave, pace, or circle. It is typical for a horse experiencing pain, fear, or

stress to paw, yawn, circle, weave, eat wood or dirt, or bite itself (flanks, chest, knees, or shoulders). Most displacement behaviors subside as the stressful environmental conditions resolve.

Vacuum activities are behaviors that occur in the absence of a stimulus. A classic example is elaborate nest-building behaviors in caged birds with no access to nesting materials. In horses, head shaking and head bobbing have been interpreted as vacuum activities aimed at nonexistent insects. Habitual vacuum activities are behaviors that were initially evoked by a meaningful stimulus (e.g., skin parasites in the case of flank biting) but that persist after the stimulus ceases.

Intention movements are abbreviated initial portions of behavior sequences. Stall circling or fence walking may initially result from thwarted attempts to escape confinement. Over time or even in the same escape episode, the distance traveled while circling or stall walking may gradually decrease; the horse just paces one side of the stall or just back and forth at the pasture gate. Eventually, the horse may only weave; weaving thus is apparently the final condensation of the pacing or circling and can be interpreted as an intention movement of walking or pacing. In a hungry horse, pawing may be an intention movement of the sequence of uncovering forage or of movement during grazing.

Mimicry involves stereotypies that may evolve by observational learning. Abundant but inconclusive anecdotal evidence supports the belief that stereotypies tend to develop in association with exposure to other horses that engage in the activities.

Finally, some stereotypies can be induced by drugs. This fact suggests possible mechanisms of development. Apomorphine is an opiate that acts as a dopaminergic agonist and stimulates the emetic center. Although horses do not vomit after receiving apomorphine, locomotor stereotypies and yawning are exhibited. Most normal horses that are confined to a stall will circle, pace, and/or weave when given apomorphine.

Regardless of how stereotypies arise and to what degree they are initially normal, they lead to well-established and aberrant behavior in domesticated or captive wild animals. The stereotypical behavior may occupy the major portion of the animal's time, often excluding or diminishing normal maintenance behaviors. Many stereotypies are maintained by inadvertent reinforcement, such as feeding a horse that paws as the feed cart comes down the aisle. A stallion's daily pacing at the stall door as he anticipates breeding time is reliably reinforced by breeding. Changing management to eliminate reinforcement or, alternatively, rewarding cessation of the behavior can effectively eliminate some stereotypies.

Isolation and stimulus deprivation increase the likelihood of stereotypies. Because noisy stereotypies often lead to attention from humans, stereotypies that produce rhythmic sound may be inherently rewarding to isolated or stimulus-deprived animals. By means of 24-hour video surveillance, I (Dr. McDonnell) observed that several horses performed stereotypies only when humans were in the barn; the handlers had the erroneous impression that the stereotypical behavior was continuous. My preliminary findings indicate that repetitious motor behavior may reinforce itself via the release of endogenous opiates.

In humans, stereotypies may be one feature of a more complex psychophysiologic disorder, such as obsessive-compulsive disorder. Stereotypies in animals may represent a similar disorder²; however, a specific diagnosis of obsessive-compulsive disorder in animals is premature in the absence of a better understanding of the neurochemical basis of such complex disorders.

Researchers determined that 15% of horses in Ontario engage in some form of stereotypical behavior (including masturbation). Until recently, spontaneous erection and masturbation were considered equine stereotypies.³ Close observation of confined, pastured, and free-ranging horses has confirmed that all normal stallions exhibit spontaneous erection and masturbation.⁴⁻⁶ Ejaculation actually occurs rarely. These behaviors are evident from birth through adulthood and are not affected by age or sociosexual environment. Even geldings exhibit spontaneous erection and masturbation, with reduced frequency and duration. Masturbation thus should not be considered a stereotypy in equine species.

Equine stereotypies are undesirable because they can lead to considerable damage to the animal and property. The remainder of this article considers some of the common stereotypies in horses and presents possible therapies. Further discussions of animal stereotypies, including those common in horses, have been published.^{1,7,8} Table I lists types of equine stereotypical behavior and Table II outlines the breed distribution of the various problems.

ORAL STEREOTYPIES

Cribbing

Cribbing is an oral behavior in which the horse grasps a surface (e.g., the rim of a bucket or the rail of a fence) with its incisors and then simultaneously flexes its neck and swallows air (aerophagia). Some horses grasp vertical surfaces; some press their necks against a horizontal object without using their teeth. Less commonly, a horse may extend the neck and swallow air without grasping or touching an object. Generally, one to two hours per day are consumed by cribbing.

TABLE I
Types of Equine Stereotypical Behavior^a

<i>Behavior</i>	<i>Number of Cases</i>
Self-mutilation	11
Stall walking	11
Cribbing	8
Wood chewing	2
Tongue play	2
Miscellaneous	3

^aPresented to the Animal Behavior Clinic, New York State College of Veterinary Medicine, Cornell University.

Two European studies indicate that approximately 2.5% of Thoroughbreds crib.^{9,10} Some data suggest that cribbing is inherited.^{9,11} The behavior apparently develops more readily in confined horses (usually near mealtime) but also occurs in pastured horses. Anecdotal, cribbing has been reported immediately after ingestion of concentrates or before a meal (if feeding time is delayed). Cribbing has been associated with colic, and swallowed air has been incriminated as a possible cause for the pain. Figure 1 depicts a related behavior that, like cribbing, occurred after the horse ate grain.

There are substantial anecdotal reports (but no experimental, objective evidence) that cribbing is modified by learning. A horse generally first cribs during exposure to a cribbing horse. Particular methods of cribbing are apparently learned from other horses. Because they are very oral and are teething, young horses may be more likely than adults to learn cribbing from other horses. Learning to crib may be contingent on genetic predisposition—a horse that has inherited the disposition to crib will begin the behavior when it sees another horse cribbing. Alternatively, the environment that causes one horse to crib may elicit cribbing in other horses.

There are various general approaches to the treatment of cribbing. The following approaches are discussed here: elimination of surfaces to grasp, punishment, surgery, and pharmacologic treatment.

Elimination of Inviting Surfaces

Cribbing may be reduced by painting surfaces with an unpalatable substance or electrifying fence rails and other horizontal surfaces. A cribbing muzzle that allows grazing and drinking but prevents grasping of a surface with the incisors usually inhibits cribbing; aerophagia may continue.

Punishment

The most common method used to reduce cribbing is a strap around the throat that exerts pressure

TABLE II
Breed Distribution of Equine Stereotypies and Aggressive Behavior^a

<i>Breed</i>	<i>Number of Cases Involving Stereotypies</i>	<i>Number of Cases Involving Aggression</i>
Quarter horse	15	11
Thoroughbred	8	14
Arabian	5	0
Appaloosa	0	5
Morgan	4	3
Standardbred	2	3
Other breeds	3	7
Donkey	1	0

^aCases presented to the Animal Behavior Clinic, New York State College of Veterinary Medicine, Cornell University.

when the horse arches its neck and attempts to swallow air. A strap with spikes may punish more effectively. A horse with a cribbing strap may continue to grasp objects, but aerophagia is reduced. Shock has been used to punish cribbing.¹² Commercially available electronic dog-training collars can be adapted to fit the equine neck and can be remotely controlled so the horse does not associate punishment with the presence of a human. I (Dr. McDonnell) have observed that the use of dummy collars before and after training may prevent the association of punishment with the collar itself.

Surgical Approaches

The various surgical treatments for cribbing include buccostomy, spinal accessory neurectomy (9th cranial nerve), myotomy or myectomy of the ventral neck muscles, or a combination of partial myectomy and spinal accessory neurectomy. The success rates of these treatments vary from 0% to 70%.¹³⁻¹⁹ Cribbing often recurs.

Pharmacologic Treatment

Theoretically, horses must derive some pleasure from cribbing; otherwise the behavior would not be sustained. Cribbing may lead to the release of endogenous opiates and thus produce pleasure. Opiate receptor blockers (e.g., naloxone hydrochloride at a dose of 0.02 mg/kg) stop horses from cribbing for 20 minutes following a 20-minute latency period. Intravenous naltrexone (0.04 mg/kg), another opiate blocker, suppressed cribbing for two to seven hours.²⁰ Cribbing is suppressed only while the opiate antagonists are present; the short half-life and expense of these drugs have made long-term opiate receptor blockade impractical.

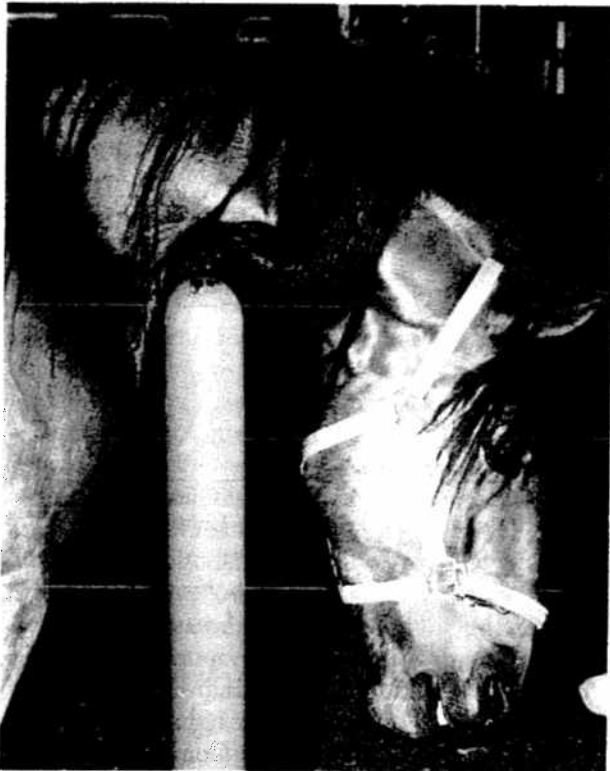


Figure 1—A novel type of stereotypy involving a horse pressing its neck around a horizontal bar.

Wood Chewing

Wood chewing is different from cribbing in that the wood is actually torn away or ingested and that air is not swallowed. Wood chewing may be a stereotypy or may reflect a normal effort to satisfy nutritional requirements. Horses that chew wood thus cannot be categorically classified as exhibiting a stereotypy. Some cases of wood chewing cease immediately if the diet is changed (e.g., if salt is made available). Highly concentrated or pelleted diets and infrequent meals increase the incidence of wood chewing.^{21,22} Indigestible roughage may play a role in the diet—feral horses as well as well-fed pastured ponies ingest trees and shrubs even when grasses are freely available. Wood chewing increases in cold and wet weather^{23,24}; this suggests a survival value in ingesting shrubs in the winter, when little else is available.

Traditional methods for reducing wood chewing include eliminating wood surfaces, covering them with metal or wire, treating them with unpalatable substances, or muzzling the horse with a grazing basket. Providing more roughage and less concentrate in the diet is advisable, as is providing salt and minerals ad libitum. An increase in exercise may reduce wood chewing.²⁵

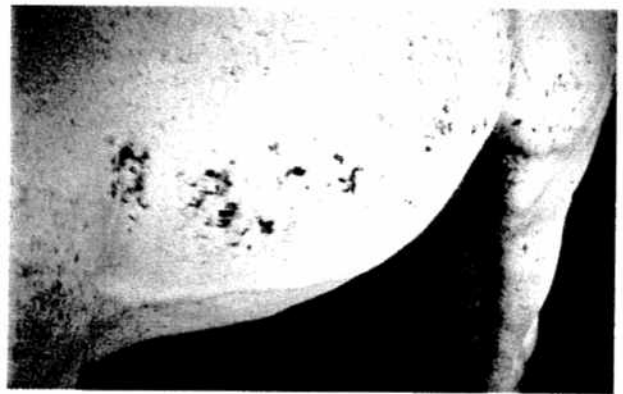


Figure 2—Lesions produced by self-mutilation.

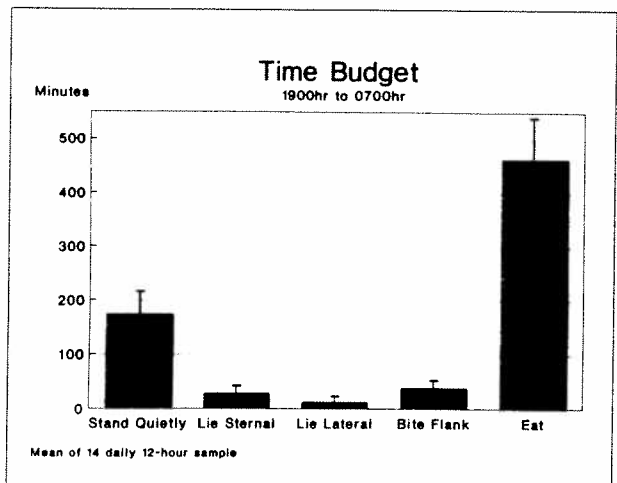


Figure 3—Time budget of a flank-biting stallion, based on 14 consecutive days of observation. Illustrated is the mean time spent in each activity per 12-hour sample (7 PM to 7 AM).

Self-Mutilation

Self-mutilation is a serious behavior problem that occurs more frequently in stallions and varies with breed and among families. The most common form involves biting the flanks or (more rarely) the chest and limbs; there may be simultaneous squealing and kicking.²⁶ The signs mimic those of acute colic but without progression to rolling or depression.²⁷ Rare forms of self-mutilation include lunging into walls and banging the head against objects. Self-mutilation may originate as a displacement activity related to stress, frustration, or fear. Some stallions begin self-mutilation when moved to stables with other stallions, when moved to isolated stables, or when within sight of (but denied contact with) mares. Figure 2 depicts the effects of self-mutilation. Figure 3 illustrates the time spent in self-mutilation and other activities.

Manipulation of the social environment, even if by trial and error, may reduce self-mutilation. A stallion

that self-mutilates in the stable may improve during pasture housing with other horses, particularly mares. A stall companion (e.g., a donkey, goat, or rabbit) may be helpful. Removal of other stallions from the environment is useful. Because any change may be initially stressful, one change should be made and left in place for a minimum of two weeks in order to appraise the effect on the horse's behavior.

Physical restraint, in the form of a muzzle or head cradle, is commonly used to inhibit flank biting. A muzzled horse usually continues to swing its head, thus continuing to inflict injury. Similarly, a horse wearing a cradle usually keeps turning its head as far as possible, inflicting new sores from contact with the restraining device. The horse may kick humans or objects.

Castration usually reduces and sometimes eliminates self-mutilation. Geldings that self-mutilate are often those that exhibit other stallionlike behaviors. Some geldings only self-mutilate in the presence of mares. The opiate antagonists used to manage cribbing reduced self-mutilation in one stallion.²⁶ Progestin treatment may reduce self-mutilating behavior, particularly in geldings. Typical dosages are as follows: altrenogest, 0.02 ml/kg/day; megestrol acetate, 65 to 86 mg/500-kg horse; and progesterone in oil, 0.4 mg/kg/day. The success rate of progestin treatment has not yet been established. As antiandrogen drugs become available, they may be useful in controlling self-mutilation in stallions.

Other Oral Behaviors

Such oral behaviors as lip smacking, tongue playing, and lolling are largely ignored by owners unless they occur in the show ring. Dropped nose bands, tongue ties, and loose-fitting head stalls that force a horse to hold the bit have been used to control tongue lolling in saddled horses.

LOCOMOTOR STEREOTYPIES Circling, Weaving, and Pacing

Most normal horses periodically circle in a stall or small paddock and occasionally walk up and down a fence and pace by the gate, especially at feeding time. Circling, fence walking, and gate pacing (Figure 4) are considered to be stereotypies if they become excessive and replace normal periods of resting or eating. Stereotypical walkers wear a trench along the fence or near the gate. Some individuals circle for hours, at a rate of several stall revolutions per minute. Most horses circle in both directions, sometimes forming a figure eight when reversing direction. Serious stall walkers lose condition, and racing or sporting performance may be negatively affected. An increase in dietary roughage may be helpful but is not



Figure 4—A horse exhibiting a stereotypical turn at the end of an excursion.

always effective in reducing the frequency or severity of the problem.

Weaving is a behavior in which the horse remains stationary but shifts its weight from forelimb to forelimb and swings its head from side to side (30 to 90 cycles per minute). Confinement and the presence of a barrier between the horse and a goal (e.g., proximity to other horses, feed, or freedom) are expected causes, at least initially. Horses that are in pain may weave, usually temporarily. Tying a stereotypical circling or pacing horse may lead to weaving for as much as three hours per day. There is some evidence that the tendency to circle, pace, and weave is inherited and possibly related to endorphin production.^{9,20} Some owners report that horses circle more frequently before a hunt or show. Figure 5 presents the time budget of a weaving mare; Figure 6 is the time budget of a normal mare for comparison.

Management approaches include providing more exercise, a less stressful environment, and a less concentrated ration. Stall toys are apparently effective only in young, playful horses. Stall size evidently does not influence stall walking behavior—one horse given access to an entire barn continued to circle in one corner.

A 24-hour videotape surveillance of the patient's behavior may help to assess quantitatively and objectively the severity of the problem and suggest management approaches. The diurnal pattern of the stereotypy as well as exacerbating and attenuating environmental conditions may be identified. For example, some stall circlers pause at the hay rack on each circle, periodically stopping to tear a piece of hay and quickly resume circling. One such horse was put on a complete roughage diet, with flakes of hay positioned around the perimeter of the stall. The horse stopped at each flake of hay; eventually the stall walking was transformed into a much slower, relaxed, grazinglike ambulation. Subsequent video surveillance indicated

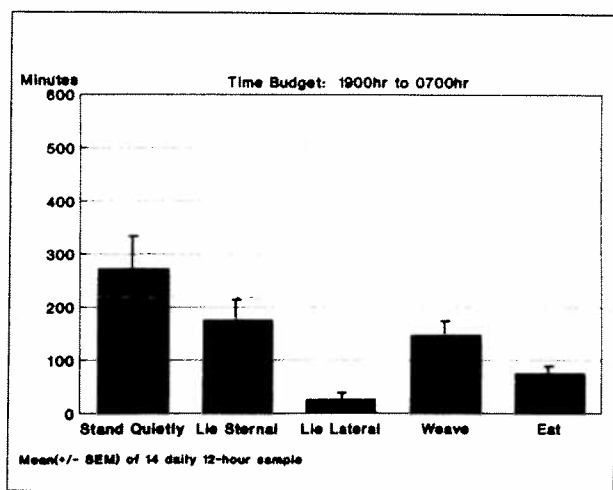


Figure 5—Time budget of a weaving mare, based on 14 consecutive days of observation. Illustrated is the mean time spent in each activity per 12-hour sample (7 PM to 7 AM). *SEM* = standard error of the mean.

a more than 80% decrease in time spent stall circling.

Tricyclic antidepressants that are used to treat obsessive-compulsive disorder in humans may be of therapeutic value for equine locomotor stereotypies. Preliminary results indicate relatively long-lasting positive effects in the treatment of seven horses that exhibited weaving, stall circling, and fence walking.

Stall Kicking

Stereotypical stall kicking involves repetitive striking of the stall walls with the hooves or hocks or stomping a hindleg against the floor with no target animal. Stereotypical kicking produces detrimental concussion of bones and joints and can damage stall walls. Stall kicking may be a form of self-stimulation or cause satisfaction from the sound made by kicking wood. Stereotypical kicking, like pawing, often begins at feeding time, when the animal is exposed to various auditory, olfactory, and visual cues. Because it is eventually fed, the horse learns that kicking or pawing is rewarded by food and may begin to paw or kick progressively earlier.

One way to extinguish the behavior is to feed the horse frequently and only when it refrains from pawing or kicking. An example of such a regimen is one-half cup of feed when the horse refrains from kicking for two seconds. Gradually, the criterion is raised to no kicking for 5, then 10, then 30 seconds before food is given. The training goes faster if the horse is simultaneously taught a countercommand (e.g., "stand") for a food reward. Alternatively, an animal can be put on a free-choice roughage diet with no specific meal times. Analogous, inadvertently reinforced bad habits include trailer kicking or pawing

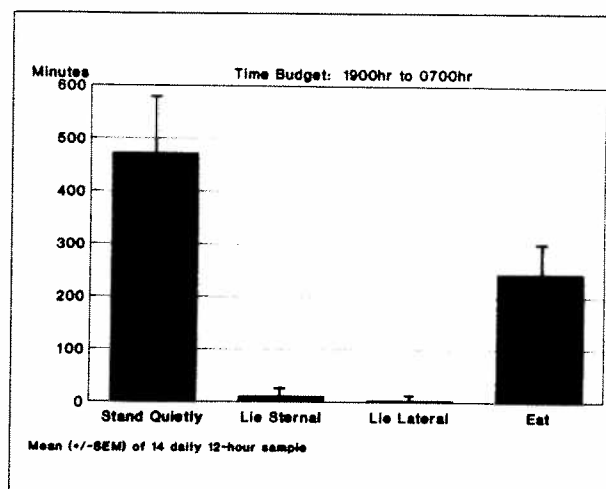


Figure 6—Time budget of a normal mare, based on 14 consecutive days of observation. Illustrated is the mean time spent in each activity per 12-hour sample (7 PM to 7 AM). *SEM* = standard error of the mean.

and stall kicking in stallions waiting to be bred.

Stall kicking that is not clearly associated with external reinforcement is more difficult to eliminate. Management aids include providing more turnout, providing a stall toy, padding the stall walls, and padding the horse's hocks. A rail that prevents the horse from backing into the wall may prevent hock knocking.

Pawing

Pawing (dragging a foot across the ground or motioning in the air) is a normal behavior that becomes a stereotypy when excessive. Horses paw in a variety of situations and with various apparent motivations: if confined, to attain proximity to another horse, to stimulate a recumbent foal to rise, in anticipation of feed, while eating grain or (more rarely) hay, when restricted from moving forward, and if in pain. Confinement can lead to apparent frustration and pawing. While confined in a box stall for training, a Standardbred stallion that had spent most of its life on pasture dug a hole 1.5 meters (four feet) deep. If dirt floors are replaced with concrete, a horse may stop pawing but may cause considerable hoof wear if pawing continues.

Some animals paw while eating grain or hay and apparently not frustrated. In its natural state, a grazing horse continually steps and nibbles. If food is presented in a stationary location (e.g., grain in a bucket or hay in a net), pawing may represent intention movements to perform the normal grazing locomotor sequence. Unless the pawing continues beyond feeding, it may not be appropriately considered a stereotypy. Pawing while restrained from moving is simi-

lar to pawing to escape confinement. Pawing in pain may exhibit frustration at not escaping the pain. In horses with colic, such pawing is frequently a prelude to rolling.²⁸

Stereotypical pawing may be managed by altering the stall floor surface to prevent holes (concrete floor) or to prevent excessive trauma to the limbs (heavy rubber matting). Providing more turnout time also is helpful.

SUMMARY

Stall walking, weaving, cribbing, pawing, head bobbing, and self-mutilation are examples of stereotypical equine behavior. These behaviors may be responses to isolation, confinement, or deprivation of foraging opportunities. Many horses are subjected to confinement isolation and limited roughage but do not develop stereotypical behavior; there is probably a genetic predisposition to the development of these behaviors. There is some indication that opiate antagonists interrupt cribbing and self-mutilation. The fact that tricyclic antidepressants may decrease weaving and stall walking indicates that the underlying biochemical mechanisms of these behaviors resemble compulsive disorders in humans. The best and most economically feasible treatments involve eliminating the environmental factors that stimulate stereotypical behaviors.

About the Authors

Dr. Houpt is affiliated with the Animal Behavior Clinic, New York State College of Veterinary Medicine, Cornell University, Ithaca, New York. Dr. McDonnell is affiliated with the New Bolton Center, School of Veterinary Medicine, University of Pennsylvania, Kennett Square, Pennsylvania.

REFERENCES

1. Kiley-Worthington M: *Behavioural Problems of Farm Animals*. Stocksfield, England, Oriel Press, 1977, p 134.
2. Goldberger E, Rapoport JL: Canine acral lick dermatitis: Response to the anti-obsessional drug clomipramine. *JAAHA* 27:179-182, 1991.
3. Luescher UA, McKeown DB, Halip J: Reviewing the causes of obsessive-compulsive disorders in horses. *Vet Med* 86:527-530, 1991.
4. McDonnell SM: Spontaneous erection and masturbation in horses. *Proc 35th Annu Conv AAEP*:567-580, 1989.
5. Wilcox S, Dusza K, Houpt K: The relationship between recumbent rest and masturbation in stallions. *Equine Vet Sci* 11(1):23-26, 1991.
6. McDonnell SM, Henry M, Bristol F: Spontaneous erection and masturbation in equids. *J Reprod Fertil Suppl* 44:664-665, 1992.
7. Luescher UA, McKeown DB, Halip J: Stereotypic or obsessive-compulsive disorders in dogs and cats. *Vet Clin North Am Small Anim Pract* 21:401-413, 1991.
8. Mason GA: Stereotypies: A critical review. *Anim Behav* 41:1015-1037, 1991.
9. Vecchiotti GG, Galanti R: Evidence of heredity of cribbing, weaving and stall walking. *Livestock Prod Sci* 14:91-95, 1987.
10. McBane S: *Behavior Problems of Horses*. North Pomfret, VT, David and Charles, 1987, p 304.
11. Hosoda T: On the heritability of susceptibility to windsucking in horses. *Jpn J Zootech Sci* 21:25, 1950.
12. Baker GJ, Kear-Colwell J: Aerophagia (windsucking) and aversion therapy in the horse. *Proc AAEP* 20:127-130, 1974.
13. Firth EC: Bilateral ventral accessory neurectomy in wind-sucking horses. *Vet Rec* 106:30-32, 1980.
14. Forssell G: The new surgical treatment against crib-biting. *Vet J* 82:538-548, 1926.
15. Greet TRC: Windsucking treated by myectomy and neurectomy. *Equine Vet J* 14:299-301, 1982.
16. Hamm D: A new surgical procedure to control crib-biting. *Proc 23rd Annu Meet AAEP*:301-302, 1977.
17. Karlander S, Mansson J, Tufvesson G: Buccostomy as a method of treatment for aerophagia (windsucking) in the horse. *Nord Vet Med* 17:455-458, 1965.
18. Owen RR, McKeating FJ, Jagger DW: Neurectomy in wind-sucking horses. *Vet Rec* 106:134-135, 1980.
19. Turner AS, White N, Ismay J: Modified Forssell's operation for crib biting in the horse. *JAVMA* 184:309-312, 1984.
20. Dodman NH, Shuster L, Court MH, Dixon R: Investigation into the use of narcotic antagonists in the treatment of a stereotypic behavior pattern (crib-biting) in the horse. *Am J Vet Res* 48:311-319, 1987.
21. Willard JG, Willard JC, Wolfram SA, Baker JP: Effect of diet on cecal pH and feeding behavior of horses. *J Anim Sci* 45:87-93, 1977.
22. Houpt KA, Perry PJ, Hintz HF, Houpt TR: Effect of meal frequency on fluid balance and behavior of ponies. *Physiol Behav* 42:401-407, 1988.
23. Jackson SA, Rich RA, Ralston SL: Feeding behavior and feed efficiency in groups of horses as a function of feeding frequency and use of alfalfa hay cubes. *J Anim Sci* 59(Suppl 1):152-153, 1984.
24. Salter RE, Hudson RJ: Feeding ecology of feral horses in western Alberta. *J Range Manag* 32:221-225, 1979.
25. Krzak WE, Gonyou HW, Lawrence LM: Wood chewing by stabled horses: Diurnal pattern and effects of exercise. *J Anim Sci* 69:1053-1058, 1991.
26. Dodman NH, Shuster L, Court MH, Patel J: Use of a narcotic antagonist (nalmefene) to suppress self-mutilative behavior in a stallion. *JAVMA* 192:1585-1587, 1988.
27. Murray MJ, Crowell-Davis S: Psychogenic colic in a horse. *JAVMA* 186:381-383, 1985.
28. Odberg FO: An interpretation of pawing by the horse (*Equus caballus* Linnaeus), displacement activity and original functions. *Saugetier Mitteil* 21:1-12, 1973.

ARTICLE #5 REVIEW QUESTIONS

The article you have read qualifies for 1/2 hour of Continuing Education Credit from the Louisiana State University School of Veterinary Medicine. Choose only the one best answer to each of the following questions; then mark your answers on the registration form inserted in *The Compendium*.

1. A stereotypy is a
 - a. goal-directed activity.
 - b. repetitive, purposeless activity.
 - c. repetitive, purposeful activity.
 - d. common activity in feral horses.
 - e. common foal activity.